

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

REC'D	02 MAR 2005
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Applicant's or agent's file reference p4128	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FI2004/000017	International filing date (day/month/year) 13.01.2004	Priority date (day/month/year) 14.01.2003
International Patent Classification (IPC) or both national classification and IPC D04H13/00		
Applicant AHLSTROM BRIGNOUD		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 10 sheets.
3. This report contains indications relating to the following items:
 - I Basis of the opinion
 - II Priority
 - III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV Lack of unity of invention
 - V Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI Certain documents cited
 - VII Certain defects in the international application
 - VIII Certain observations on the international application

Date of submission of the demand 12.10.2004	Date of completion of this report 03.03.2005
Name and mailing address of the International preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Mangin, S Telephone No. +31 70 340-1974



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/FI2004/000017

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-3, 5, 6, 9-11 as originally filed
4, 4a, 7, 7a, 8, 8a received on 12.10.2004 with letter of 06.10.2004

Claims, Numbers

1-19 received on 12.10.2004 with letter of 06.10.2004

Drawings, Sheets

1/1 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/FI2004/000017

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).
(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)
6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-19
	No: Claims	
Inventive step (IS)	Yes: Claims	1-19
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-19
	No: Claims	

2. Citations and explanations

see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/FI2004/000017

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: US 5151320

D2: WO 0153590

The document D1 and D2 are regarded as being the closest prior art to the subject-matter of claim 1.

Document D1 discloses (col.3, l.5 - col.4, l.11, col.5, l.23-28, col 5, l.44 - col.6, l.35) an installation and a process of making a composite nonwoven composed of two webs. The lower web is a 15 to 90 g/m² prebonded spunbond web made of polyamide, polyester, polyethylene or polypropylene filaments. The upper layer is a 10 to 60 g/m² fluid dispersable layer made of natural fibers (wood pulp fibers) 2-5 mm long to which synthetic fibers may be added. Both layers are then hydroentangled with water jets equipped with perforated plates comprising orifices between 0.05 and 2 mm spaced at 1 mm with a water pressure up to 1200 psi.

Document D2 discloses (p.4, l.16 - p.7, l.7) the installation and the process of making a composite nonwoven composed of two nonwoven webs. the lower web is a prebonded spunbond web made of polyester, polypropylene, polyethylene or polyamide fibers. the upper web is a cellulosic fiber dispersion laid on the lower web. Both layers are then hydroentangled with water jets equipped with perforated plates comprising orifices between 0.05 and 2 mm spaced at 1 mm with a water pressure up to 1200 psi, dried to remove the excess of water, embossed and wounded into a roll. additionally two conventional samples (sample 1 and 2 of table 1) are given, where the lower web has fibers of 2,2 deniers.

The subject-matter of claim 1 differs from this known documents D1 and D2 in that the lower web is a carded web of fibers having a length of 15-80 mm and a dtex of at least 1,7 dtex. **The Subject-matter of claim 1 is therefore new according to Art. 33(2) PCT.**

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/FI2004/000017

The problem to be solved by the present invention may be regarded as to provide a drapable composite nonwoven.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) as it cannot be derived from any prior art.

Claims 2-12 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

The above argumentation applies mutatis mutandis to the installation. The subject-matter of claims 13-19 is therefore novel and involve an inventive step according to Art. 33(2) and 33(3) PCT.

upper web directly on the lower web already formed or being formed, by wet method, according to a conventional paper-making technique.

To be more precise, the invention relates to a manufacturing process of a composite nonwoven composed of two webs, respectively, a lower web comprising long artificial and/or synthetic fibres, the size of which is between 15 and 80 mm and an upper web comprising short natural fibres, the size of which is between 0.5 and 8 mm.

10. This process is characterized, on-line, by:
- dispersing first of all the natural fibres into the water,
 - then, putting the aqueous dispersion thus obtained on a carded lower web that is about to form or has been manufactured beforehand,
 - then filtering the excess water through the lower web,
 - then interlacing the fibres of the upper web with the fibres of the lower web with water jets,
 - finally drying and then reeling up the obtained composite nonwoven.

In the rest of the description, the expression "artificial and/or synthetic fibres" denotes the fibres chosen from the group comprising, among the artificial fibres, the viscose fibres, and among the synthetic fibres, the polyester, polypropylene, polyamide, polyacrylic, polyvinyl alcohol and polyethylene fibres, as such or as a mixture.

25 In other words, the main advantage of the process of the invention consists in using short natural fibres, not transformed or treated, especially cellulose fibres that are dispersed directly into the water by conventional paper-making technology.

30 Further, the dispersion of the fibres into the water during several minutes gives them plastic properties allowing optimising the efficiency of interlacing by water jets as the dispersion is put on the lower web. It follows that

~~upper web directly on the lower web already formed or being formed, by wet method, according to a conventional paper-making technique.~~

To be more precise, the invention relates to a manufacturing process of a composite nonwoven composed of two webs, respectively, a lower web comprising long artificial and/or synthetic fibres, the size of which is between 15 and 80 mm and an upper web comprising short natural fibres, the size of which is between 0.5 and 8 mm.

- 10 This process is characterized, on-line, by:
- carding the lower web of said artificial and/or synthetic fibres having a length between 15 and 80 mm, and a dtex degree of at least 1,7 dtex,
 - prebonding said lower web,
 - dispersing said natural fibres having a length between 0.5 and 8 mm into water to form an aqueous dispersion,
 - laying the aqueous dispersion on the carded lower web to form the upper web,
 - filtering the excess water through the lower web,
 - interlacing the fibres of the upper web with the fibres of the lower web with water jets,
 - drying and reeling up the obtained composite nonwoven.

25 In the rest of the description, the expression "artificial and/or synthetic fibres" denotes the fibres chosen from the group comprising, among the artificial fibres, the viscose fibres, and among the synthetic fibres, the polyester, polypropylene, polyamide, polycrylic, polyvinyl alcohol and polyethylene fibres, as such or as a mixture.

30 In other words, the main advantage of the process of the invention consists in using short natural fibres, not transformed or treated, especially cellulose fibres that are dispersed directly into the water by conventional paper-making technology.

In another embodiment, after drying and before the reel-up, the composite, embossed or not, is subjected to a mechanical softening treatment by one of the processes known by an expert of the CLUPAK, SUPATEX, SANFOR or MICREX type.

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The nonwovens made with the process of the invention have several advantages. First of all, they are very economic and very absorbent considering the high proportion of natural cellulose fibres representing from 30 to 70 % by weight of the composite. Further, they are very regular due to the wet laid method technology of paper production used for the formation of the upper web. Furthermore, they are very resistant because of the presence of the long fibres in the lower web. Further, the combination of natural fibres and synthetic and/or artificial fibres makes the product both comfortable and stable. Finally, the embossing step able to be inserted before the drying step, possibly combined with the mechanical softening treatment, gives the product an appearance and a textile touch especially attractive to the consumer.

Thus, the nonwovens manufactured according to the process of the invention can not only be used as moisturized towels, especially as wiping towels, but also as tablecloth and table napkins, bath towels, wall covering, upholstery of vehicles, depilatory strips, bags for siccative products, gloves, embroidery, cloths and wiping of printing works.

The invention also relates to an installation for carrying out the previously described process.

In a particular embodiment, the installation comprises:

- ~~- a conveyor for transporting the carded lower web that is about to form or has already been manufactured,~~
- ~~- a head box set above the conveyor and intended to contain an aqueous dispersion comprising the natural fibres,~~

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~~In another embodiment, after drying and before the reel-up, the composite, embossed or not, is subjected to a mechanical softening treatment by one of the processes known by an expert of the CLUPAK, SUPATEX, SANFOR or MICREX type.~~

5

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~~The invention also relates to an installation for carrying out the previously described process.~~

In a particular embodiment, the installation comprises:

- a carding unit for forming a lower web of said artificial and/or synthetic fibres having a length between 15 and 80 mm, and a dtex degree of at least 1,7 dtex,
- a conveyor for transporting a carded lower web,
- a head box set above the conveyor and intended to contain an aqueous dispersion comprising the natural fibres having a length between 0.5 and 8 mm,

- ~~suction means placed under the conveyor and intended to eliminate the excess water as the aqueous dispersion is put on the lower web,~~
- ~~bonding means by water jets placed above the conveyor and downstream of the conveyor for interlacing the fibres of the upper web with those of the lower web,~~
- ~~drying means of the composite placed downstream of the conveyor,~~
- ~~reeling means of the finished dry composite.~~

10 In practice, the conveyor is in the form of a metallic or synthetic conveyor perforated in such a way that it allows water to pass therethrough by suction due to suction boxes placed under the said conveyor.

15 The bonding means by water jets are in the form of several hydraulic injectors provided with perforated plates, each of them comprising one or two rows of holes having a diameter of between 80 and 160 micrometers, the holes of each row being spaced 0.4 – 1.8 mm apart and the rows themselves being spaced 0.5 – 2 mm apart, the measures being taken from axle to axle. In practice, the number of injectors is between 2 and 12, each injector being supplied by water at a pressure of between 20 and 140 bars. Beyond this limit, 20 the obtained products cannot be used as towels.

25 In the embodiment, according to which the lower web is formed on-line, the installation further comprises manufacturing means of the said web placed upstream of the conveyor.

30 In this hypothesis, the installation comprises, between the manufacturing means of the lower web and the conveyor, a hydraulic pre-bonding unit having a pre-wetting ramp of the web and a support cylinder around which are placed the hydraulic injectors.

35 In practice, the manufacturing means of the lower web are in the form of a card followed or not by a spreader-coater.

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- suction means set under the conveyor and intended to eliminate the excess water as the aqueous dispersion is put on the lower web,
- bonding means by water jets placed above the conveyor and downstream of the head box, intended to interlace the fibres of the upper web with those of the lower web,
- drying means of the composite placed downstream of the conveyor, and
- reeling means of the dry composite.

5 In practice, the conveyor is in the form of a metallic or synthetic conveyor
 10 perforated in such a way that it allows water to pass therethrough by suction due to suction boxes placed under the said conveyor.

15 The bonding means by water jets are in the form of several hydraulic injectors provided with perforated plates, each of them comprising one or two rows of holes having a diameter of between 80 and 160 micrometers, the holes of each row being spaced 0.4 – 1.8 mm apart and the rows themselves being spaced 0.5 – 2 mm apart, the measures being taken from axle to axle. In practice, the number of injectors is between 2 and 12, each injector being supplied by water at a pressure of between 20 and 140 bars. Beyond this limit,
 20 the obtained products cannot be used as towels.

In the embodiment, according to which the lower web is formed on-line, the installation further comprises manufacturing means of the said web placed upstream of the conveyor.

25 In this hypothesis, the installation comprises, between the manufacturing means of the lower web and the conveyor, a hydraulic pre-bonding unit having a pre-wetting ramp of the web and a support cylinder around which are placed the hydraulic injectors.

30 In practice, the manufacturing means of the lower web are in the form of a card followed or not by a spreader-coater.

CLAIMS

1. A manufacturing process of a composite nonwoven composed of two webs, respectively, a lower web comprising long artificial and/or synthetic fibres, and an upper web comprising short natural fibres, characterized, on-line, by:
 - carding the lower web of said artificial and/or synthetic fibres having a length between 15 and 80 mm, and a dtex degree of at least 1,7 dtex,
 - prebonding said lower web,
 - dispersing said natural fibres having a length between 0.5 and 8 mm into water to form an aqueous dispersion,
 - laying the aqueous dispersion on the carded lower web to form the upper web,
 - filtering the excess water through the lower web,
 - interlacing the fibres of the upper web with the fibres of the lower web with water jets,
 - drying and reeling up the obtained composite nonwoven.
2. A process according to claim 1, characterized in that the artificial or synthetic fibres are chosen from the group comprising the viscose, polyester, polypropylene, polyamide, polyacrylic, polyvinyl alcohol and polyethylene fibres, as such or as a mixture.
3. A process according to claim 1, characterized in that the mass of the lower web is at least 25 g/m².
4. A process according to claim 1, characterized in that the interlacing of the fibres of the upper web with the fibres of the lower web is obtained by water jets, the number of which is between 2 and 12, each water jet being equipped with perforated plates, each of them comprising one or two rows of holes having a diameter of between 80 and 160 micrometers, the holes of each row being spaced 0.4 – 1.8 mm apart and the rows themselves being spaced 0.5 – 2mm apart, each injector being supplied with water at a pressure of between 20 and 140 bars.

Amended Claims - 06.10.2004

5. A process according to claim 1, characterized in that the lower web is pre-bonded by means of water jets.
- 5 6. A process according to claim 1, characterized in that the lower web makes up between 30 and 70 % by weight of the composite.
7. A process according to claim 1, characterized in that the natural fibres are cellulose fibres.
- 10 8. A process according to claim 1, characterized in that the upper web further contains synthetic fibres making up at least 50 % by weight of the web.
9. A process according to claim 1, characterized in that the upper web 15 makes up between 30 and 70 % by weight of the composite.
10. A process according to claim 1, characterized in that the fibres of the upper web are exclusively cellulose fibres, the concentration of the said fibres in the aqueous dispersion being between 0.5 and 10 g/l.
- 20 11. A process according to claim 1, characterized in that before drying, the composite is subjected to an embossing step.
12. A process according to claim 1, characterized in that before reeling up, 25 the composite is subjected to a softening step.
13. An installation for carrying out the process object of one of the claims 1 to 12.
- 30 14. An installation for manufacturing a composite support composed of two webs, respectively, a lower web comprising long artificial and/or synthetic fibres, and an upper web comprising short natural fibres, characterized by:

- a carding unit for forming a lower web of said artificial and/or synthetic fibres having a length between 15 and 80 mm, and a dtex degree of at least 1,7 dtex,
- a conveyor (3) for transporting a carded lower web,
- 5 - a head box (4) set above the conveyor (3) and intended to contain an aqueous dispersion comprising the natural fibres having a length between 0.5 and 8 mm,
- suction means set under the conveyor (3) and intended to eliminate the excess water as the aqueous dispersion is put on the lower web,
- 10 - bonding means by water jets (5) placed above the conveyor and downstream of the head box (4), intended to interlace the fibres of the upper web with those of the lower web,
- drying means (9) of the composite placed downstream of the conveyor (3), and
- 15 - reeling means (11) of the dry composite.

15. An installation for manufacturing a composite support according to claim 14, characterized in that it comprises bonding means by water jets (5) in form of several hydraulic injectors provided with perforated plates, each of them comprising one or two rows of holes having a diameter of between 80 and 160 micrometers, the holes of each row being spaced 0,4 – 1,8 mm apart and the rows themselves being spaced 0,5 – 2 mm apart, the number of injectors being between 2 and 12 and supplied at a pressure of between 20 and 140 bars.

25 16. An installation for manufacturing a composite support according to claim 15, characterized in that it comprises manufacturing means (1) of the lower web placed upstream of the conveyor (3).

30 17. An installation for manufacturing a composite support according to claim 16, characterized in that it comprises, between the manufacturing means of the lower web (1) and the conveyor (3), a hydraulic pre-bonding unit (2) comprising a pre-wetting ramp of the web (2a) and a support roll (2b), around which are placed the hydraulic injectors (2c).

Amended Claims - 06.10.2004

18. An installation for manufacturing a composite support according to claim 14, characterized in that it comprises, before the drying unit (9), a hydraulic embossing calendar (6) consisting of a suction roll (6a) coated with a wire, the surface of which has an embossed design and hollows, the said roll being associated with hydraulic injectors (6b) placed around its surface.
- 5
19. An installation for manufacturing a composite support according to claim 14, characterized in that it also has, prior to the reel-up (11), a softening device 10 (10).